

2.2 Welcome Partners and Unwanted Guests



Figure 2.11 Ants and aphids have a symbiotic relationship.

Imagine a great white shark cruising toward you through tropical waters. As a human, your only thought would be to get away. Yet one small fish, called a remora, cannot get close enough! It uses suckers on its head to attach itself firmly to the shark's skin and then dines on bacteria and micro-organisms that are unhealthy for the shark. **Symbiosis** is when two species live closely together in a relationship that lasts over time. The odd association between the large, fearsome shark and the little remora is an example of a symbiotic relationship.

Symbiotic relationships are common in the natural world although some associations may seem unusual. For example aphids on a rose bush have a symbiotic relationship with the rose bush as they feed on it. Ants and aphids have a symbiotic relationship as shown in Figure 2.11. The ants protect the aphids from predators, and in return they drink the sweet liquid aphids excrete.

There are three main types of symbiotic relationships. **Parasitism** is a symbiotic relationship in which one partner benefits and the other partner is harmed. Typically, one of the partners lives on or in the other organism and feeds on it. External parasites, such as the louse shown in Figure 2.12, are often very small and so they are able to hide in hair, fur, or feathers. Some internal parasites are microscopic. The malaria-causing parasite *Plasmodium* lives and reproduces inside the human red blood cell! Other internal parasites, such as the tapeworm shown in figure 2.13, grow to be very large.

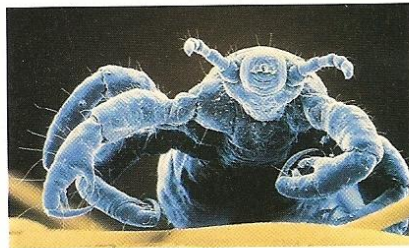


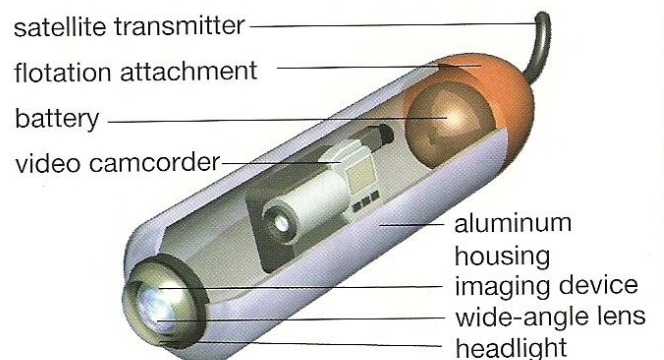
Figure 2.12 Lice are parasites that feed on the blood of mammals. This photograph of a louse has been magnified 55 times.



Figure 2.13 Tapeworms are common parasites that live inside other animal's intestines.



In 1986 scientist-filmmaker Greg Marshall watched a shark with a remora clinging to its side. He realized that if a camera could be attached to the side of the shark in a similar way, it would give an amazing close-up view of the shark's movements and behaviour. Thus was born a device called the "crittercam." It is a small battery-operated video camera that can be attached to the side of a shark by a small metal dart. The dart pierces the outer layer of the shark's hide without harming the shark. Shark food is thrown into the water to attract the shark close enough to a boat so that the crittercam can be attached. After a time, the crittercam is automatically released from the shark, tracked by radio signals, and retrieved.



The organism that provides food for a parasite is called the **host**. Some parasites stay with the host only for a brief time while they reproduce. Other parasites, such as the tapeworm, may stay with one host for the host's lifetime. Typically a parasite does not kill its host (if it did, it would die as well), but it often weakens its host by taking nutrients away, and thus shorten its host's life.

Mutualism is a relationship between two different organisms, in which each partner benefits from the relationship. Termites, shown in Figure 2.14, are insects that live in large colonies and feed on wood, cardboard, and paper. They are decomposers, but they are incapable of breaking down the wood to get the nutrients on their own. They have a mutualistic relationship with single-celled micro-organisms, called protozoa, that live in their digestive tract. The protozoa, like the ones shown in Figure 2.15, digest the wood. The termites live on the protozoa's waste products. Their relationship is mutually beneficial — although it is not beneficial to the humans whose homes termites eat!

Lichens, shown in Figure 2.16, appear to be single organisms but are, in fact, made up of two different partners. Figure 2.17 shows the partners — an alga (plural: algae) and a fungus living together. In partnership, they are able to live where neither could survive alone, such as on a bare rock or a tree trunk. The alga makes food for both, while the fungus forms a sponge-like body that protects, anchors, and holds the water they both need.

Mutualistic relationships may be critical to the survival of certain organisms. For instance, sometimes one organism cannot reproduce unless it interacts with an organism of another species. This is the case with the dodo bird and the calvaria tree described in Chapter 1 on page 28.



Figure 2.14 Caution! Termites at work.

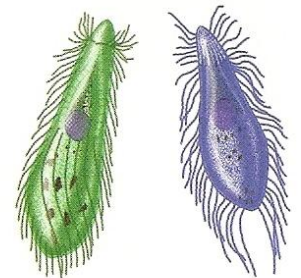


Figure 2.15 Two kinds of protozoa that live in termites.

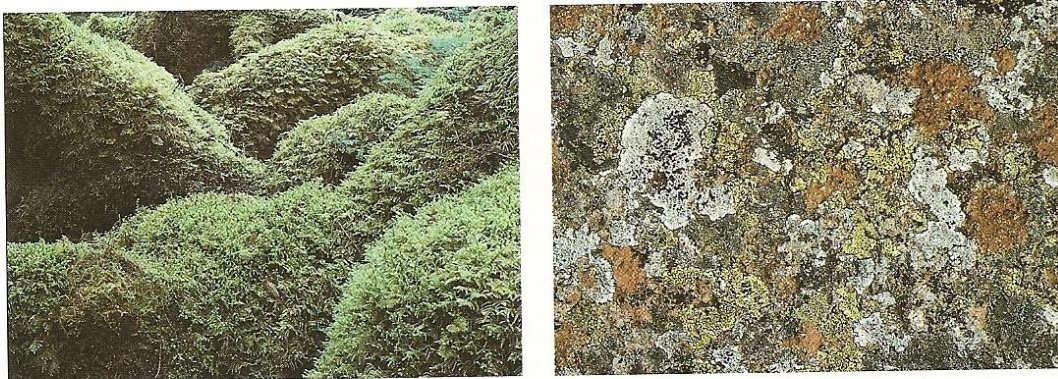


Figure 2.16 Leafy lichen (on the left) and crusty lichen (on the right) are both examples of mutualism.

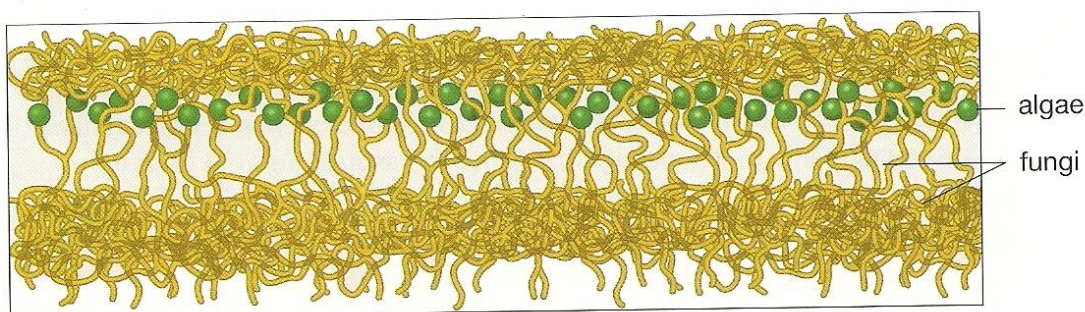


Figure 2.17 Layers of fungi and algae in lichen, greatly magnified

DidYouKnow?

Tapeworms that can live in the small intestines of human beings can grow as long as 10 m. While in the egg stage of their life cycle, these parasites enter the body in meat or fish that has not been inspected and properly or sufficiently cooked.

Pause & Reflect



Symbiotic relationships are very common in the natural world. Think of a symbiotic relationship, either commensal, parasitic, or mutualistic. Draw a picture or write a poem in your Science Log describing the relationship.

Commensalism is a symbiotic relationship in which one partner benefits and the other partner does not appear either to lose or to gain from the relationship. For example, many species of flowering orchid, like the one in Figure 2.18A, live high up, attached to the trunks of trees. The orchids benefit by having a safe place to live and a constant source of water from rain dripping down the tree trunks. The trees do not seem either to benefit or to lose from the presence of the orchids. Clownfish and sea anemones also have a commensal relationship. Figure 2.18B shows the clownfish living among the poisonous tentacles of the hosting anemone. The fish gains safety and eats the scraps left over from the anemone's dinner. There is no obvious benefit or cost to the anemone.

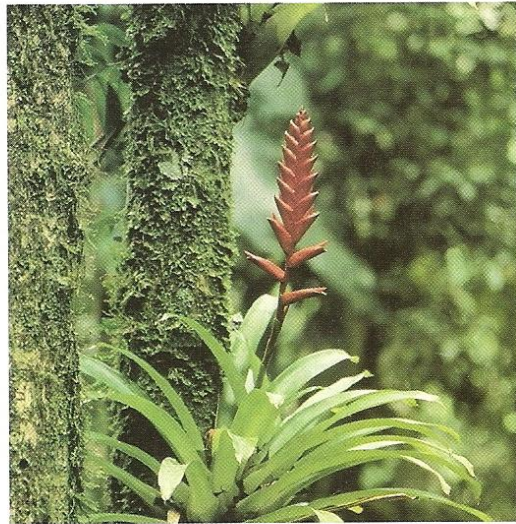


Figure 2.18A An orchid plant attached high up on a tree trunk.

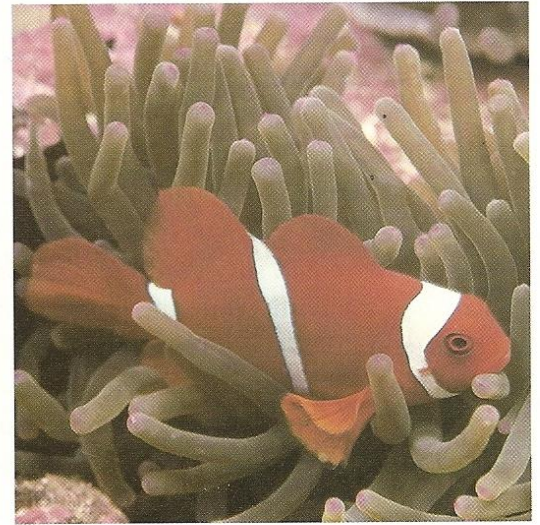


Figure 2.18B A clownfish living among the tentacles of a poisonous sea anemone.

Check Your Understanding

1. Define the following terms in your own words, and give an example of each.

- | | |
|----------------|------------------|
| (a) symbiosis | (d) parasite |
| (b) parasitism | (e) host |
| (c) mutualism | (f) commensalism |

2. Compare the effects of parasites and predators on a community.

3. **Apply** Brainstorm in a group and come up with examples of relationships that are similar to mutualism in a human community. Describe them.



4. **Thinking Critically** Think about each of the following pairs of organisms, and name the type of symbiotic relationship the partners might have. Indicate what the gains and/or losses might be for each partner:

- (a) a flowering plant and an insect
- (b) a whale and a barnacle living on the whale's back
- (c) a dog and a flea
- (d) a nectar-eating bat and a flowering cactus
- (e) a bird and a water buffalo